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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*).
2. Texts in the figures are not translated and shown as it is.

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## FULL CONTENTS

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### [Claim(s)]

[Claim 1] A vent port is formed in a part of peripheral wall of a cylinder while a screw shaft is arranged in the inside of a cylinder. It has the paddle part formed in the portion before and after the above-mentioned screw shaft faces across the above-mentioned vent port. The above-mentioned vent port is formed in the shape of an rectangular pipe, and the distance of the length direction in the above-mentioned vent port is formed in 1.5 or more times of the pitch of the screw of the screw part inserted into the above-mentioned paddle part. While throwing in materials from the material input mouth with which a crosswise distance was prepared in the back end side of the above-mentioned cylinder using the vent type kneading machine currently formed more than the width method of a cylinder, and this size and carrying out volatilization removal of the volatile matter content in the above-mentioned materials from the above-mentioned vent port The process of the resin for semiconductor closure characterized by making resin for semiconductor closure breathe out from the discharge part established in the tip side of a cylinder.

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### [Detailed Description of the Invention]

#### [0001]

[Industrial Application] This invention relates to the process of the resin for semiconductor closure which used the vent type kneading machine.

#### [0002]

[Description of the Prior Art] From the former, the vent technology in a kneading machine is widely used in deaeration of thermoplastics, or other fields. There are some which formed the vent port 20 as shown in the extrusion machine for biaxial deaeration at drawing 7 as such vent technology. This extrusion machine for deaeration uses slurry-like material as materials, and he is trying to make the volatile matter content in slurry-like material deaerate in the above-mentioned vent port 20. And in the cylinder 21 of the extrusion machine for deaeration while installing two screw shafts 22 and 22 which rotate to an opposite direction mutually in right and left side by side the distance between the both-sides walls 20a which start and form a vent port 20 from a part of upper wall of a cylinder 21, and carry out for relativity in this vent port 20 -- the distance between the main axes of both the above-mentioned screw shafts 22 and 22, and abbreviation -- similarly it has set up.

[0003]

[Problem to be solved by the invention] however, [ the structure of the above-mentioned vent port 20 ] In using thermosetting resin material with high viscosity at the time of kneading as materials of resin for semiconductor closure For the hyperviscosity, the mixture (compound) which makes the main ingredients thermosetting resin material which adhered at the tip of the screw of both the screw shafts 22 and 22 adheres to the lower end part 20b of the side wall 20a of a vent port 20, and grows gradually, and there is a problem of blockading the above-mentioned lower end part 20b at an early stage. Moreover, since it adhered to the above-mentioned lower end part 20b and stagnated, the compound it became superfluous reacting may mix and there is also a problem that it is inferior in respect of productivity and quality.

[0004] Therefore, as for the resin for semiconductor closure manufactured using the extrusion machine for deaeration which has the above vent ports 20, the volatilization ingredient content in the closure temperature will become high. Then, although reducing the above-mentioned volatilization ingredient content by carrying out heating decompression processing (JP,S61-261315,A) of an organic ingredient and heat-treatment (JP,S61-261316,A) of an inorganic ingredient is performed By these methods, there is a problem that circumference environment needs the increase in a head end process and to be controlled, and a manufacture price will become high.

[0005] This invention was made in view of such a situation, prevents the blockade of the vent port in a vent type kneading machine, and sets offer of the process of resin for semiconductor closure which can reduce the volatilization ingredient content in the closure temperature of the resin for semiconductor closure obtained using this vent type kneading machine as that purpose.

[0006]

[Means for solving problem] In order to attain the above-mentioned purpose, [ the process of resin for semiconductor closure of this invention ] A vent port is formed in a part of peripheral wall of a cylinder while a screw shaft is arranged in the inside of a cylinder. It has the paddle part formed in the portion before and after the above-mentioned screw shaft faces across the above-mentioned vent port. The above-mentioned vent port is formed in the shape of an rectangular pipe, and the distance of the length direction in the above-mentioned vent port is formed in 1.5 or more times of the pitch of the screw of the screw part inserted into the above-mentioned paddle part. While throwing in materials from the material input mouth with which a crosswise distance was prepared in the back end side of the above-mentioned cylinder using the vent type kneading machine currently formed more than the width method of a cylinder, and this size and carrying out volatilization removal of the volatile matter content in the above-mentioned materials from the above-mentioned vent port The composition of making resin for semiconductor closure breathe out from the discharge part established in the tip side of a cylinder is taken.

[0007]

[Function] namely, in order to make a manufacture price inexpensive while being able to reduce the volatilization ingredient content in the closure temperature when this invention persons manufacture resin for semiconductor closure It hit on an idea with whether the vent type kneading machine which a compound adheres to a vent port and does not blockade a vent port should be used, and a series of researches were repeated. As a result, the length [ the above-mentioned vent port is formed in the shape of an rectangular pipe, and ] direction () in the above-mentioned vent port Namely, the distance of the direction in alignment with a screw shaft is formed in 1.5 or more times of the pitch of the screw of the

screw part (this screw part is prepared in the portion corresponding to a vent port) of a screw shaft. When a crosswise (namely, direction which intersects perpendicularly with a screw shaft) distance uses the vent type kneading machine currently formed more than the width method of a cylinder, and this size It found out that a compound adhered to a vent port, did not blockade a vent port, and the charge of an IC package with little volatilization ingredient content in closure temperature was obtained by this, and this invention was reached.

[0008] Below, this invention is explained in detail.

[0009] While a screw shaft is arranged in the inside of a cylinder, the vent type kneading machine used for this invention is formed in a part of peripheral wall of a cylinder by the vent port, and [ the above-mentioned screw shaft ] While the screw part for materials sending is formed in the portion corresponding to the above-mentioned vent port, the paddle part for kneading is formed in the portion before and behind that in the state of inserting this screw part. By this while a materials sending zone is formed between the above-mentioned screw part and the inner skin of a cylinder A kneading (heating) zone is formed between each above-mentioned paddle part and the inner skin of a cylinder, and since the above-mentioned materials sending zone is sealed in the shape of airtightness in the kneading (heating) zone of the both sides and the degree of vacuum of a materials sending zone is maintained, deaeration in a vent port comes to be performed efficiently. Such deaeration is performed by the vacuum pump etc. Moreover, the distance of the length [ in this invention, the above-mentioned vent port is formed in the shape of an rectangular pipe, and ] direction in this vent port is the pitch (usually) of the screw of the above-mentioned screw part. Suitably, it is formed in about 5 times and a crosswise distance is formed in 1.5 or more 5-20mm times more than the width method of a cylinder, and this size. Namely, the distance of the length direction in the above-mentioned vent port is formed in less than 1.5 times of the pitch of the screw of the above-mentioned screw part. It is because a compound adheres to the side wall of a vent port easily and a vent port blockades for a short time, when a crosswise distance is formed under in the width method of a cylinder.

[0010] The materials of the semiconductor closure resin used for this invention are obtained using an epoxy resin ingredient, a hardening agent ingredient, and a silica powder ingredient, and have usually become powdered or the shape of a tablet which tableted this. The viscosity [ materials / such ] at the time of kneading is set as 6000 - 12000Poise.

[0011] As for the above-mentioned epoxy resin ingredient, it is desirable to use what has two or more epoxy groups into 1 molecule. For example, a cresol NOBORAKKU type epoxy resin, a phenol NOBORAKKU type epoxy resin, a bisphenol A Novo Lacq type epoxy resin, a bisphenol A type epoxy resin, and a BIFENIRU type epoxy resin are raised. These are independent, or they are used, combining them two or more kinds. Also in these, an epoxy equivalent is used especially suitably [ that 100-300 and whose softening temperature are 50-130 degrees C ].

[0012] As for the above-mentioned hardening agent ingredient, phenol NOBORAKKU resin is usually used. As for this phenol NOBORAKKU resin, it is desirable that a hydroxyl equivalent uses that 70-150, and whose softening temperature are 50-110 degrees C. As for the combination rate of the Novo Lacq type hardening agent ingredient and an epoxy resin ingredient, it is desirable to set up so that the hydroxyl group of the Novo Lacq type hardening agent may become 0.5-2.0Eq per 1Eq of epoxy groups in the above-mentioned epoxy resin. It is the range of 0.8-1.2Eq more preferably.

[0013] The above-mentioned silica powder ingredient is used as a bulking agent of an epoxy resin constituent, and crystal silica and melting silica powder are raised as such silica powder. These are

independent or are used collectively.

[0014] In addition to the above-mentioned epoxy resin ingredient, a hardening agent ingredient, and a silica powder ingredient, various additive agents, such as the Silang coupling agent, a hardening accelerator, a release agent, fire retardant, a fire-resistant auxiliary agent, and colorant, are suitably blended with the above-mentioned semiconductor closure resin if needed.

[0015] Below, the work example of this invention is explained.

[0016]

[Working example] Drawing 1 and drawing 2 show one work example of the vent type kneading machine used for this invention. In this work example, a vent type kneading machine (700mm in full length, 250mm of breadth) is a biaxial type, and is equipped with a cylinder 1 and two screw shafts 4 (50-150rpm of number of rotations) which are installed by right and left side by side in this cylinder 1, and rotate in this direction. The 1st screw part 5a for materials sending, the 1st paddle part 6a for kneading, the 2nd screw part 5b for materials sending, the 2nd paddle part 6b for kneading, and the 3rd screw part 5c for return are formed in both [ these ] the screw shafts 4 sequentially from the after that side. On the other hand, while the material provisioning mouth 2 is set up by the above-mentioned cylinder 1 at the back end part of the upper wall, the discharge mouth 3 is drilled in the front end part (portion corresponding to the front end part of the above-mentioned 2nd paddle part 6b) of the low wall. Moreover, while heating means (not shown), such as a heater, are attached to the portion of the peripheral wall corresponding to each above-mentioned paddle parts 6a and 6b, the tubed vent port 7 formed in the cross section form rectangle is set up by the portion of the upper wall corresponding to the above-mentioned 2nd screw part 5b at the above-mentioned cylinder 1. The distance between those order both-sides walls 7a is set to the pitch (12mm) (60mm) of the screw of the 2nd screw part 5b 5 times the value of a screw, and, as for this vent port 7, the distance between the right-and-left both-sides walls 7b is set as the width method and this size (95mm) of a cylinder 1. In a figure, 8 is a lid which covers with the lid of the upper surface opening of a vent port 7, and is opening for free passage the opening 8a drilled by the side wall of this lid 8 to the vacuum pump (not shown).

[0017] Semiconductor closure resin can be manufactured as follows using the above-mentioned vent type kneading machine. That is, the powdered materials (the viscosity [ materials / these ] at the time of kneading is set as 10000Poise) obtained by having first used 16% (others [ hardening agent / an epoxy resin and ]) of the organic ingredient and 84% (others [ silica powder ]) of the inorganic ingredient for the material provisioning mouth 2 set up by the back end part of the cylinder 1 are thrown in. It sends in the 1st screw part 5a in a cylinder 1 at the 1st paddle part 6a, and heating kneading is carried out here and then these thrown-in materials are sent to the 2nd paddle part 6b in the 2nd screw part 5b. In the middle of this sending, the volatilization ingredient of a compound is deaerated from a vent port 7 by operation of a vacuum pump. The compound kneaded in the above-mentioned 2nd paddle part 6b is taken out from the discharge mouth 3 of the front end part of a cylinder 1 as semiconductor closure resin after it. Moreover, in the 3rd screw part 5c, a compound is returned to the discharge mouth 3 side.

[0018] In this work example, since a compound adheres to the vent port 7 of a vent type kneading machine, and is not blockaded and sufficient volatilization ingredient can be deaerated, the resin for semiconductor closure obtained becomes what has the few volatilization ingredient content in that closure temperature. And in this work example, since it is made the structure which both the screw shafts 4 installed side by side in the cylinder 1 of a vent type kneading machine rotate in this direction, respectively, the effect of stay prevention of a compound is done so.

[0019] Drawing 3 shows other work examples of this invention. In this work example, the right-and-left both-sides wall 7b of a vent port 7 is formed in the inclination wall jugged out outside, so that it goes to the bottom. In such a case, compared with the above-mentioned work example, a compound becomes difficult to adhere to a vent port 7, and the effect of blockade prevention of a vent port 7 is done so. The other portion is the same as that of the above-mentioned work example, and gives the same mark to the same portion.

[0020] Drawing 4 shows the work example of further others of this invention. In this work example, when a compound adheres to the vent port 7 order both-sides wall 7a, the pushing equipment for pushing in this compound below is attached. Namely, two cylinders 9 in which the main part 9a was attached downward at lid 8 order each side wall 8a as for this pushing equipment, By having the tabular pushing implement 9c attached at the tip of the cylinder rod 9b of each cylinder 9, arranging the 1 side of this pushing implement 9c in vent port 7 order each side wall 7a free [ sliding ], and operating the above-mentioned cylinder 9 The cylinder rod 9b is made to expand and contract in the up-and-down direction, and it enables it to push in below the compound which adhered to the vent port 7 order both-sides wall 7a with the pushing implement 9c. In forming such pushing equipment, compound viscosity falls according to the kind and operating condition of a compound, and it has the advantage that it is convenient when a compound surely adheres to the vent port 7 order both-sides wall 7a, and continuation operation of a vent type kneading machine is attained.

[0021] When semiconductor closure resin (sample) is manufactured using the vent type kneading machine shown in Table 1 at drawing 1 (work examples 1 and 2), When semiconductor closure resin (sample) is manufactured using the kneading machine which is not equipped with the vent (comparative examples 1 and 2), the result of having measured the volatilization ingredient content in each case is shown. In measurement of this volatilization ingredient content, it is each sample ([ a work example 1 and a comparative example 1 ]). the silica powder content in a sample is 84 weight % -- a work example 2 and a comparative example 2 -- the silica powder content in a sample -- 84 weight % -- it is -- weighing was carried out to the 5g petri dish, drying by heating was carried out at 175 degrees C, and the above-mentioned volatilization ingredient content was computed by the weight change before and behind processing.

[0022]

[Table 1]

	ベントの有無	揮発成分含有率 (重量%)	シリカ粉末含有量 (重量%)
実施例 1	○	0. 0 4 2	8 4
実施例 2	○	0. 0 4 4	8 7
比較例 1	×	0. 1 2 9	8 4
比較例 2	×	0. 1 1 3	8 7

[0023] In the above-mentioned table 1, volatilization ingredient content shows weight % at the closure temperature of 175 degrees C. this measurement result shows that volatilization ingredient content is markedly alike and there are few work-example articles 1 and 2 than the comparative example article 1 and 2.

[0024] In addition, although the pushing implement 9c of pushing equipment is formed in tabular, it forms in the shape of a frame, and you may make it push in the compound adhering to vent port 7 order and each side walls 7a and 7b on either side below in the example shown in drawing 5 , as it does not limit to this and is shown in drawing 6 .

[0025]

[Effect of the Invention] as mentioned above, [ according to the process of semiconductor closure resin of this invention / stop / compound adhesion in the vent port of a vent type kneading machine / occurring ] The productivity drive of the resin for semiconductor closure obtained using this vent type kneading machine and improved quality become possible, and reduction of the volatilization ingredient content in closure temperature can be aimed at now without a pretreatment of materials.

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view of an important section showing one work example of the vent type kneading machine used for this invention.

[Drawing 2] It is the side view of the above-mentioned vent type kneading machine.

[Drawing 3] It is the sectional view showing other work examples of this invention.

[Drawing 4] It is the explanatory view of pushing equipment.

[Drawing 5] It is the explanatory view of a pushing implement used for the above-mentioned pushing equipment.

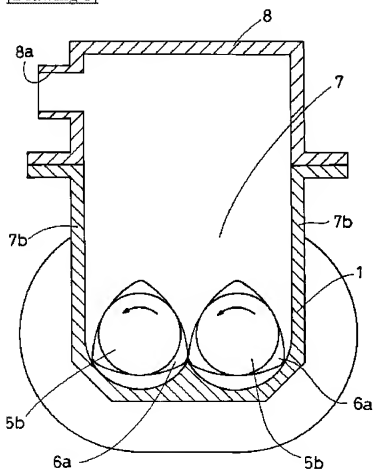
[Drawing 6] It is the explanatory view of the modification of the above-mentioned pushing implement.

[Drawing 7] It is the sectional view of an important section showing the conventional example.

[Explanations of letters or numerals]

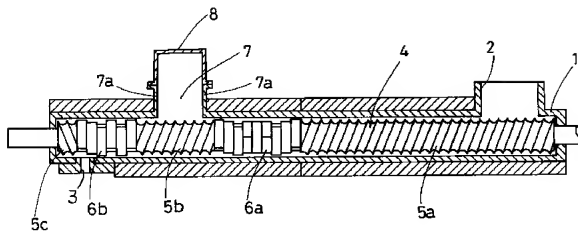
- 1 Cylinder
- 2 Material Provisioning Mouth
- 3 Discharge Mouth
- 4 Screw Shaft
- 5a The 1st screw part
- 5b The 2nd screw part
- 6a The 1st paddle part
- 6b The 2nd paddle part
- 7 Vent Port

[Drawing 1]

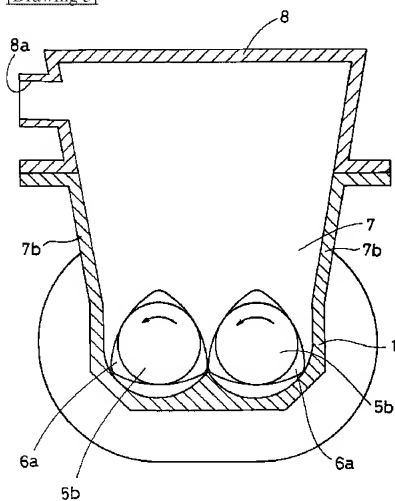


- 1 : シリンダ
- 5b : 第2スクリュー部
- 6a : 第1パドル部
- 7 : ベントポート

[Drawing 2]

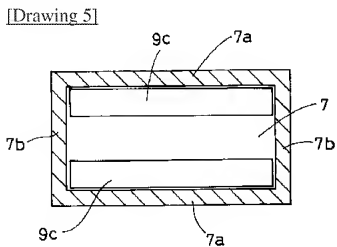
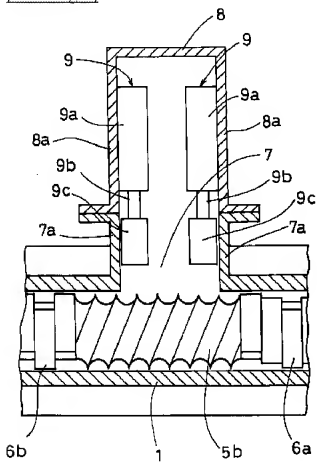
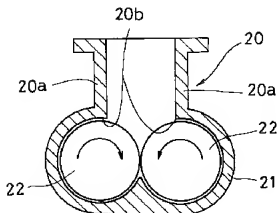


[Drawing 3]

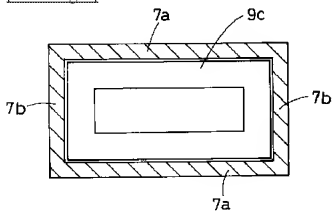


[Drawing 7]





[Drawing 6]



[Translation done.]